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ASTRONOMICAL OBSERVATIONS IN 1913.

Made by Torvald Köhl, at Odder, Denmark.

Variable Stars.

(The instrument used is a 3-inch Steinheil, power 42.)

S *Ursæ Majoris.*[1]

Jan.	2:	S = d.
	5:	2 steps > d.
	9:	= d.
	26:	2 steps > d.
	30:	1 step > d.
Feb.	8:	2 steps > d.
	22:	1 step < e.
	25:	id.
Mar.	5:	2 steps < e.
	8:	3 steps < e.
	12:	3 steps > f′.
	22:	half way between e and f.
	24:	1 step > f′.
	26:	id.
Apr.	2:	1 step < f.
	4:	half way between f and g.
	8:	id.
May	8:	invisible
July	29:	half way between c and d.
Aug.	1:	3 steps > d.
	24:	4 steps > d.
	27:	2 steps > d.
	29:	id.
	30:	id.
	31:	1 step > d.
Sept.	6:	½ step > d.
	7:	1 step > d.
	12:	= d.
	22:	id.
	27:	½ step < d.
	29:	= e.
Oct.	21:	3 steps > f.
	27:	id.
Nov.	4:	= f′.
	19:	half way between f and g.
	30:	1 step < g.
Dec.	24:	3 steps < g.

T *Ursæ Majoris.*[2]

Jan.	2:	T = b.
	5:	id.
	9:	1 step > c.
	26:	1½ step < d.
	30:	1½ step > e.
Feb.	8:	1 step > e.
	25:	2 steps < g.
Mar.	8:	faint.
	12:	very faint.
	22:	invisible.
	24:	id.
Mar.	26:	id.
Apr.	2:	id.
	4:	id.
	8:	id.
May	8:	id.
July	29:	= a in the sketch on S.
Aug.	1:	id.
	24:	= b in the sketch on S.
	27:	id.

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[1] Vide the sketch in the *Publications A. S. P.*, No. 73, **12**, 56.

[2] Vide the sketch in the *Publications A. S. P.*, No. 22, **4**, 63.

Aug. 29: = c in the sketch on S.
30: id.
31: id.
Sept. 6: 3 steps > a.
7: id.
12: 1 step > a.
22: = a.
27: < b. > c.

Sept. 29: = b.
30: id.
Oct. 21: 2 steps > e.
27: = e.
Nov. 4: half way between e and g.
19: 3 steps < f.
Dec. 24: invisible.

W *Pegasi.*[1]

Jan. 3: W 2 steps < h.
26: invisible.
July 29: 1 step < b.
Aug. 1: = b.
24: half way between b and c.
27: id.
29: id.
31: 2 steps > c.
Sept. 7: 2 steps > c.
12: 1 step > c.

Sept. 22: = c.
27: 2 steps < c.
29: id.
Oct. 21: = e.
27: 2 steps < e.
Nov. 4: = f.
19: = g.
22: = h.
30: ½ step > h.
Dec. 24: < h. > n.

SS *Cygni.*[1]

Jan. 2, 8^h: SS invisible.
9, 6^h: very faint.
26, 6^h: invisible.
Feb. 9, 8^h: = id.
May 8, 10^h: invisible.
July 29, 11^h: very faint.
Aug. 1, 10^h: id.
24, 10^h: = ^{h}.
27, 9^h: id.
29, 9^h: id.
31, 9^h: id.
Sept. 4, 9^h: = g.
5, 9^h: half way between c and d
6, 9^h: = c.
7, 9^h: 1 step > c.
12, 9^h: 1 step < c.
13, 8^h: 2 steps < c.

Sept. 19, 8^h: 2 steps < d.
22, 8^h: < f. > g.
23, 8^h: = f.
29, 8^h: < g. > h.
Oct. 21, 8^h: id.
27, 11^h: invisible.
31, 9^h: < g. > h.
Nov. 6, 8^h: 2 steps < d.
19, 6^h: half way between d and e
24, 6^h: = h.
30, 7^h: 2 steps < g.
Dec. 17, 6^h: = h.
24, 8^h: 2 steps < h.

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[1] Vide the sketch in the *Publications A. S. P.*, No. 141, **24**, 109.

Z *Cygni.*[1]

Jan. 2: Z 1 step < c.
5: = c.
9: id.
26: 1 step > b.
Feb. 9: = b.
May 8: 3 steps < e.
Aug. 1: invisible.
Aug. 25: = e.
Aug. 27: id.
Sept. 4: = d.
7: 2 steps > d.
Oct. 27: 2 steps > b.
Nov. 19 half way between a and b.
Dec. 7: = b.

U *Herculis.*[2]

May 8: V = e.
July 29: 2 steps < h.
Aug. 1: id.
24: id.
27: 4 steps < h.
Aug. 31: id.
Sept. 7: 5 steps < h.
22: 6 steps < h.
Oct. 21: utmost faint.

S *Persei.*[3]

Feb. 9: S = a.
22: 1 step > a.
Mar. 12: = a.
26: id.
Apr. 2: id.
8: 2 steps > a.
22: = a.
Aug. 1: = d.
24: 2 steps < c.
27: = d.
Sept. 22: = d.
Oct. 21: id.
Nov. 4: ½ step > e.
30: 2 steps > f.

Var. 25, 1913, *Ursæ Majoris.*

(This star = B. D. + 60° 1412 ($9^{m}.5$) = *f* in the sketch on T *Ursæ Majoris.*

Jan. 2: f 1 step > g.
5: 2 steps > g.
9: = g.
Feb. 8: 2 steps > g.
9: id.
25: = g.
Mar. 12: 1 step > g.
24: 2 steps > g.
26: id.
Apr. 2: id.
4: = g.
8: 1 step > g.
Aug. 1: 2 steps < g.
Aug. 24: = g.
29: 2 steps < g.
30: id.
31: id.
Sept. 6: ½ step < g.
7: id.
22: 1 step < g.
29: 2 steps > g.
30: 1 step < g.
Oct. 21: = g.
Nov. 4: 1 step > g.
19: id.
Dec. 24: = g.

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[1] Vide the sketch in the *Publications A. S. P.*, No. 100, **17**, 16.
[2] Vide the sketch in the *Publications A. S. P.*, No. 135, **23**, 42.
[3] Vide the sketch in the *Publications A. S. P.*, No. 135, **23**, 43.

Several other stars have been watched, such as Y *Tauri* (B. D. + 20° 1083), which on January 5th, 31st, and February 8th was a little fainter, but on February 25th, March 22d, 24th, April 2d, 6th, 8th and 14th a little brighter than the star B. D. + 20° 1095. — TV *Cygni*[1] has in the past year only shown small variations, being either equal to or a little brighter than C.

LARGE METEORS.

Fireballs have been observed from stations in Denmark and surrounding countries on the following dates: January 27th (sixteen observations from Denmark, one from the North Sea, and one from Scotland), March 24th, April 1st, 8th, 28th, May 28th, June 6th, July 26th, 28th, 30th, August 9th, 18th, September 6th, 23d, 24th, October 2d, 21st, 31st, November 4th, 10th, 18th (two meteors), 19th, 23d (three meteors), 26th, 27th, 28th, December 2d, 18th, 24th. One of the two under November 18th named meteors was especially interesting. A great fireball with a long tail was seen and the *meteorite fell down* in the sea near Dyrvik on Fröya at Trondhjem, Norway, after having hit and demolished the mast of a yacht in the harbor and a pane was cracking into an adjoining house at the same time.

SHOOTING-STARS.

Shooting-stars were observed from seven stations in Denmark from August 9th to 12th. At these stations 116 paths of shooting-stars were mapped and four proved suitable for calculation, under which two fireballs were included — the meteors on April 8th and October 21st. These four meteors have given the following results:—

From Observation.

No.	Time, P. M.	Station.	Beginning.	Ending,	Mag.	Observer.
1	Apr. 8, 9^{h} 5^{m}	Odense	290° + 69°	342° + 63°	♀	C. T. BUSK.
		Copenhagen	49 + 53	39 + 42 .5	♀	A. FOCK.
2	Aug. 9, 10 42.5	Odder	336 + 64	317 + 59	2	T. KÖHL.
		Jyderup	222 + 71.5	213 + 54	2	M. POVLSEN.
3	Aug. 12, 10 14	Nyborg	....	12 + 26	♃	T. VAABEN.
		Möen	....	172 + 49	♃	KIERULFF.
4	Oct. 21, 10 43	Odense	....	80 + 30	1	C. T. BUSK.
		Copenhagen	....	324 + 24	1	KIERULFF.

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[1] Vide the sketch in the *Publications A. S. P.*, No. 135, **23**, 43.

From Calculation.

No.	Beginning.			Ending.			Real length of the path.	Radiant.	
	h	λ	ϕ	h	λ	ϕ	β	AR	Decl.
1	99.9	1° 36′.3 w	56° 28′.9	91.2	2° 30′.1 w	56° 52′.1	71.2	202°	÷ 14°
2	117.2	1 49.9 w	56 14.2	77.7	2 10.1 w	56 2.5	50	194	+ 65
3				32.9	0 44.9 w	55 24.6			
4				56.4	0 51.3 w	55 27.5			

h and β are expressed in kilometers; λ is longitude from Copenhagen; ϕ is north latitude; h is the altitude of the meteor above the Earth's surface.

The Carina-Meteor catalog has now reached a number of 5,699 meteors, observed from stations in Denmark and surrounding countries from 1875 to 1913, inclusive.

From August 11th to 16th, inclusive, astronomical lectures were held at the Carina Observatory in Odder.

In the estimation of variable stars I often have been assisted by Mr. J. SKAKKE, who also, by the aid of a Darlot-lens, has undertaken a work on stellar photography.